

# sif tips



Sifbronze was established in 1925 and is one of the last companies who continue to manufacture welding consumables here in the UK.

In February 2008 they became a wholly owned company within the WWS Group and now feature as part of the combined WELDABILITY SIF product range.

The company has kindly offered to provide a series of technical advice documents for the welding sales engineer and AWD members, following the traditional SIFTIPS format which was originally started in 1932.

## Aluminium

Years ago 'aluminium' was considered a difficult material to weld, since when using oxy-acetylene there was no change in colour to indicate the metal's temperature and suddenly it could melt and collapse! With the introduction of TIG and MIG welding processes, these 'welder fears' have been put to one side, providing that the properties of aluminium are understood. This article is intended to give a general overview.

Aluminium and its alloys have special properties of lightness, strength, conductivity, malleability etc which make it a particularly useful material in a variety of industries. The metal can be either in 'cast' form or extruded (wrought), which then divides into non-heat treatable and heat treatable. Generally, it is readily weldable, but it is important to understand some of its characteristics:

**Oxidation:** in air aluminium immediately forms an oxide layer on its surface, which will increase in thickness with time. This oxide layer must be controlled during the welding process, by chemically and mechanically cleaning the metal, using an aggressive flux or ensure the arc has reverse polarity (electrode positive). Correct gas shielding (argon) will prevent oxides reforming in the weld.

**Thermal Conductivity:** as aluminium is a very good thermal conductor, it will rapidly disperse heat. Care must be taken to avoid distortion and possibly cracking.

**Colour:** unlike steel, there is no change in colour as it is being heated. Look out for a 'wet' appearance. For gas brazing, melting of flux powder is a temperature indicator.

**Preparation:** smooth all edges of workpiece to minimise trapped dirt. Use a commercial degreaser and stainless steel brush to remove dirt, oil, paint. Dry surface thoroughly. If TIG welding, wipe filler rod clean of any surface oil.

**Application:** support the joint to be welded, preferably with a jig, but spot tacking can be used. Keep the arc travelling at the right speed to build up a bead of the right proportions. Do not stop/start on one weld, as this can lead to oxidation/porosity. Carry out the weld quickly to minimise distortion.

### Typical welding consumables:

Arc welding electrodes - HILCO Aluminil Si5 & Si12 (important for welder to get into a comfortable position, as weld run must be deposited very quickly).

Brazing - Sifalumin No 36 and Aluminium No 36 Flux (separate data sheet available).

Soldering - SIF 555 Aluminium Solder (separate data sheet available).

Gas welding - Sifalumin No 14 or No 15 and Aluminium Flux.

MIG & TIG welding -

SIFMIG 1050	Sifalumin No 14	for pure aluminium
SIFMIG 4043	Sifalumin No 15	contains 5% silicon, for castings and heat treatable alloys 6063, 6061 & 6083. Weld will discolour if anodised.
SIFMIG 4047	Sifalumin No 16	contains 12% silicon, for castings and automotive applications.
SIFMIG 5356	Sifalumin No 27	contains 5% magnesium, for similar 5xxx alloys and heat treatable alloys 6063, 6061 & 6083.
SIFMIG 5183	Sifalumin No 28	contains 5% magnesium with 0.75% manganese for improved weld strength
SIFMIG 5556	Sifalumin No 37	contains 5.3% magnesium and other closely controlled elements for 5083 military and aerospace applications.

**Conclusion:** it is hoped that these comments will lead to sound welds being produced. However, provided the right filler wire has been used, defects are usually due to inadequate cleaning/preparation or poor technique (shielding gas not effective, too long an arc, incorrect torch angle).

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